Docket No.: HOK-0256
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Koji Maeda et al.

Application No.: 10/523,526 Confirmation No.: 1863

Filed: February 4, 2005 Art Unit: 1711

For: WATER-SOLUBLE FLAME-RETARDANT POLYESTER RESIN, RESIN COMPOSITION CONTAINING THE RESIN, AND FIBER PRODUCT TREATED WITH THE RESIN COMPOSITION

Examiner: Irina S. Zemel

DECLARATION UNDER 37 C.F.R. 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, _____, a citizen of Japan, residing at _____ _____, declare and say as follows:

1. I am a graduate of _____ in _____(Year) and received a _____ Degree from _____ _____ in _____ (Month, Year);

2. I am employed by _____ as a researcher in _____.

I read the Office Action issued on April 12, 2007 in the above identified application and the prior arts cited therein, and then carried out comparative experiments.

I would like to report the results of the comparative experiments below.

[Supplement Example 8]

A water-soluble, flame retardant polyester resin having the acid value of 27.7, the intrinsic viscosity of 0.42 and the number average molecular weight of 9100 was obtained according to substantially the same method as Example 4 except that the amount used of dimethyl terephthalate is 247.6 parts by weight, and the amount used of trimellitic anhydride is 31. 6 parts by weight (= 10 mol%).

25 parts by weight of this water-soluble, flame retardant polyester resin, 64.3 parts by weight of water, 10 parts by weight of ethylene glycol mono-t-butyl ether, and 0.7 parts by weight of a 25% aqueous ammonia were added to a dissolver, and then agitated. It was dissolved at a temperature range of 80 to 95 °C over 2 hours to obtain a 25% aqueous solution of the water-soluble, flame retardant polyester resin. By using this solution, the evaluations (Measurement of Pencil Hardness, Measurements of Tensile Fracture Strength and Elongation Percentage after Tensile Fracture, Washing Test/Flaming Test, Adhesion Test) were carried out, as in the case of Example 1. Results are shown in Supplement Table 1.

[Supplement Example 9]

A water-soluble, flame retardant polyester resin having the acid value of 63.1, the intrinsic viscosity of 0.35 and the number average molecular weight of 6800 was obtained according to substantially the same method as Example 4 except that the amount used of dimethyl terephthalate is 183.8 parts by weight, and the amount used of trimellitic anhydride is 94.7 parts by weight (= 30 mol%).

25 parts by weight of this water-soluble, flame retardant polyester resin, 73.4 parts by weight of water, and 1.6 parts by weight of a 25% aqueous ammonia were added to a dissolver, and then agitated. It was dissolved at a temperature range of 80 to 95 °C over 2 hours to obtain a 25% aqueous solution of the water-soluble, flame retardant polyester resin. By using this solution, the evaluations were carried out, as in the case of Example 1. Results are shown in Supplement Table 1.

[Supplement Example 10]

A water-soluble, flame retardant polyester resin having the acid value of 70.5, the intrinsic viscosity of 0.33 and the number average molecular weight of 6100 was obtained according to substantially the same method as Example 4 except that the amount used of dimethyl terephthalate is 158.3 parts by weight, and the amount used of trimellitic anhydride is 120.0 parts by weight (= 38 mol%).

25 parts by weight of this water-soluble, flame retardant polyester resin, 73.2 parts by weight of water, and 1.8 parts by weight of a 25% aqueous ammonia were added to a dissolver, and then agitated. It was dissolved at a temperature range of 80 to 95 °C over 2 hours to obtain a 25% aqueous solution of the water-soluble, flame retardant polyester resin. By using this solution, the evaluations were carried out, as in the case of Example 1. Results are shown in Supplement Table 1.

[Supplement Example 11]

A water-soluble, flame retardant polyester resin having the acid value of 58.4, the intrinsic viscosity of 0.39 and the number average molecular weight of 7300 was obtained according to substantially the same method as Example 4 except that the amount used of dimethyl terephthalate is 231.7 parts by weight, and 53.7 parts by weight (= 15 mol%) of pyromellitic anhydride was used as tetrabasic acid anhydride in place of using trimellitic anhydride (= 0 mol%).

25 parts by weight of this water-soluble, flame retardant polyester resin, 68.5 parts by weight of water, 5 parts by weight of ethylene glycol mono-t-butyl ether, and 1.5 parts by weight of a 25% aqueous ammonia were added to a dissolver, and then agitated. It was dissolved at a temperature range of 80 to 95 °C over 2 hours to obtain a 25% aqueous solution of the water-soluble, flame retardant polyester resin. By using this solution, the evaluations were carried out, as in the case of Example 1. Results are shown in Supplement Table 1.

[Supplement Example 12]

A water-soluble, flame retardant polyester resin having the acid value of 60.9, the intrinsic viscosity of 0.38 and the number average molecular weight of 7200 was obtained according to substantially the same method as Example 4 except that the amount used of dimethyl terephthalate is 201.4 parts by weight, and 17.9 parts by weight (= 5 mol%) of pyromellitic anhydride and 61.5 parts by weight (= 20 mol%) of trimellitic anhydride were used as the water-solubility imparting component.

25 parts by weight of this water-soluble, flame retardant polyester resin, 68.4 parts by weight of water, 5 parts by weight of ethylene glycol mono-t-butyl ether, and 1.6 parts by weight of a 25% aqueous ammonia were added to a dissolver, and then agitated. It was dissolved at a temperature range of 80 to 95 °C over 2 hours to obtain a 25% aqueous solution of the water-soluble, flame retardant polyester resin. By using this solution, the evaluations were carried out, as in the case of Example 1. Results are shown in Supplement Table 1.

[Supplement Comparative Example 6]

A flame retardant polyester resin having the acid value of 5.6, the intrinsic viscosity of 0.62 and the number average molecular weight of 12100 was obtained according to substantially the same method as Example 4 except that the amount used of dimethyl terephthalate is 273.2 parts by weight, and the amount used of trimellitic anhydride is 6.3 parts by weight (= 2 mol% < 5 mol%).

An aqueous solution of this flame retardant polyester resin could not be prepared by a similar process to the above-described Supplement Examples.

[Supplement Comparative Example 7]

A water-soluble, flame retardant polyester resin having the acid value of 87.9, the intrinsic viscosity of 0.21 and the number average molecular weight of 2700 was obtained according to substantially the same method as Example 4 except that the

amount used of dimethyl terephthalate is 136.0 parts by weight, and the amount used of trimellitic anhydride is 142.1 parts by weight (= 45 mol% > 40 mol%).

25 parts by weight of this water-soluble, flame retardant polyester resin, 67.7 parts by weight of water, 5 parts by weight of ethylene glycol mono-t-butyl ether, and 2.3 parts by weight of a 25% aqueous ammonia were added to a dissolver, and then agitated. It was dissolved at a temperature range of 80 to 95 °C over 2 hours to obtain a 25% aqueous solution of the water-soluble, flame retardant polyester resin. By using this solution, the evaluations were carried out, as in the case of Example 1. Results are shown in Supplement Table 1.

Supplement Table 1

		Supplement Examples					Supplement Comparative Examples	
		8	9	10	11	12	6	7
Pencil Hardness		2H	2H	H	2H	2H	2H	2H
Tensile Test	Tensile Fracture Strength ($x10^3N/cm^2$)	2.56	2.1	1.93	2.38	2.29	---	1.66
	Tensile Fracture Elongation (%)	50	42	40	44	35	---	41
Washing/ Flaming Tests	HL=0	5	5	5	5	5	---	5
	HL=10	5	5	5	5	5	---	1
Adhesion		○	○	○	○	○	---	△

As understood from the results of Supplement Examples 8-12, when trimellitic anhydride of the tribasic acid anhydride and/or pyromellitic anhydride of the tetrabasic acid anhydride was used as the water-solubility imparting component within the claimed range, films having excellent flame resistance and good film properties were obtained. However, in Supplemental Comparative Example 6 where the amount of the water-solubility imparting component is smaller than 5 mol%, it was hard to prepare the aqueous solution of the flame retardant polyester resin, as described above. On the other hand, when the amount of the water-solubility imparting component is larger than 40

mol% (Supplemental Comparative Example 7), there was a tendency of deteriorating the flame resistance and the adhesion.

I hereby declare that all statements made herein based on my knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Executed on _____ _____

Signed by